

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-028570

(43)Date of publication of application : 29.01.2002

(51)Int.Cl.

B06B 1/04
B06B 1/16
H02K 7/065
H02K 23/54
H02K 23/58

(21)Application number : 2001-095900

(71)Applicant : SAMSUNG ELECTRO MECH CO
LTD

(22)Date of filing : 29.03.2001

(72)Inventor : AN SANG GIL
JUNG SUNG TAI
LEE TA KYOUNG

(30)Priority

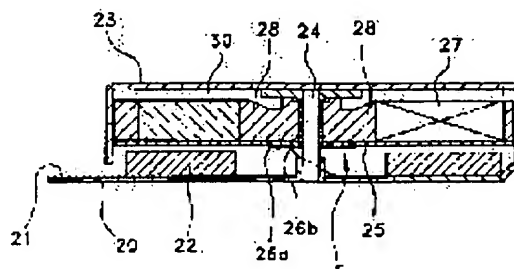
Priority number : 2000 200035221 Priority date : 26.06.2000 Priority country : KR

(54) FLAT TYPE VIBRATION MOTOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a thin motor composed obtained by reducing an amount of eccentricity of a thin rotor.

SOLUTION: The flat type vibration motor comprises an under part case, an upper part case for covering the upper part of the lower case, a shaft joining the centers of both cases and supporting the cases, a lower part substrate attached to a part of the upper side face of the lower part case, a magnet attached to the upper side face of the lower part case in the outside of the lower part substrate, an upper part substrate, which is a disk-like thin plate supported by the shaft in a rotatable manner, a commutator installed as a large number of segments in the peripheral parts of the axial center in the



bottom face of the upper part substrate, a pair of brushes whose one ends are fixed in the lower part substrate and the other ends are brought into contact with the commutator to be joined electrically, a pair of wound coils arranged at intervals at a constant angle in one side in one face of the upper part substrate, a weight with a high specific gravity installed in the other side of the upper part substrate corresponding to wound coils, and an insulator made of a resin which fills the space between the wound coils and the weight and firmly fix them in the upper part substrate.

LEGAL STATUS

[Date of request for examination] 29.03.2001

[Date of sending the examiner's decision of rejection] 05.10.2004

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3675728

[Date of registration] 13.05.2005

[Number of appeal against examiner's decision of rejection] 2005-00046

[Date of requesting appeal against examiner's decision of rejection] 04.01.2005

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] The shaft which connects and supports the center to center of lower housing, the upper housing which covers the upper part of said lower housing, and said lower housing and said upper housing, The lower substrate to which it adheres in a part of upside side of said lower housing, and the magnet to which it adheres [on the outside of said lower substrate] in the upside side of said lower housing, The up substrate which it is supported by said shaft pivotable and is circular sheet metal, The commutator with which the periphery section of a shaft center is equipped as many segments on the base of said up substrate, The brush of a couple which an end is fixed to said lower substrate, and the other end is contacted by the commutator, and is connected electrically, the whole surface of said up substrate -- 1 side -- mutual -- a fixed include angle -- alienation -- with the coil coil of the couple arranged The flat mold vibrating motor characterized by filling up between said coil coil, the weight of the high specific gravity arranged at a side besides a corresponding up substrate, and said coil coil and weight, and including the insulator made of resin which makes these fix to an up substrate strongly.

[Claim 2] The magnitude of said weight is a flat mold vibrating motor according to claim 1 characterized by being formed within 45 degrees - 180 degrees on a machine square.

[Claim 3] Said weight is a flat mold vibrating motor according to claim 1 characterized by forming the level difference section in a peripheral face.

[Claim 4] Said weight is a flat mold vibrating motor according to claim 1 characterized by being the alloy of high specific gravity.

[Claim 5] The shaft which connects and supports the center to center of lower housing, the upper housing which covers the upper part of said lower housing, and said lower housing and said upper housing, The lower substrate to which it adheres in the upside side of said lower housing, and the magnet to which it adheres [on the outside of said lower substrate] in the upside side of said lower housing, The up substrate formed out of balance so that it may be supported by said shaft pivotable, circular sheet metal may be turned off and lacked at a predetermined include angle and eccentric support may be carried out at a shaft, The commutator with which the periphery section of a shaft center is equipped as many segments on the base of said up substrate, The brush of a couple which an end is fixed to said lower substrate, and the other end is contacted by said commutator, and is connected electrically, The coil coil of the couple by which isolation arrangement is carried out at an angle of mutual regularity in one aspect of said up substrate at 1 side, The flat mold vibrating motor characterized by filling up between the weight of the high specific gravity arranged between the coil coils of said couple, and said coil coil and weight, and including the insulator made of resin which makes these fix to an up substrate strongly.

[Claim 6] Said weight is a flat mold vibrating motor according to claim 5 characterized by being the alloy of high specific gravity.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the flat mold vibrating motor which attained thin shape-ization of a motor, securing the oscillation characteristic which made the up substrate with which it had the coil coil possess the weight of high specific gravity, and was stabilized in it.

[0002]

[Description of the Prior Art] It is the oscillation to which one of the functions surely needed with communication equipment is an arrival-of-the-mail function, and being most mostly used to this arrival-of-the-mail function generally shakes the sound and device like a melody or an audible tone.

[0003] If the function which a user needs for arrival of the mail beforehand if it puts in another way is chosen, the user can sense arrival of the mail, when the function chosen at the time of arrival of the mail operates.

[0004] Especially an oscillating function is mainly used by others as consideration for not making trouble of **** out of the function at the time of such arrival in the location into which many people are thronging.

[0005] A sound function like a melody or an audible tone transmits outside the melody and audible tone of various classes which were made to mainly input into the interior beforehand through a small loudspeaker, and enables it to sense arrival of the mail in the function at the time of arrival of the mail. As for an oscillating function, it is common to make a small vibrating motor drive, to tell the oscillating force to the case of a device, and to vibrate a device.

[0006] On the other hand, the oscillating function currently used conventionally is operating with the vibrating motor with which it is separately equipped in a device. It is the flat mold vibrating motor which has a large appearance more relatively than the thickness of a diameter as the most typical thing of such a vibrating motor showed to drawing 1 and which is commonly called a pancake or coin type.

[0007] This flat mold vibrating motor is large, it consists of a stator which becomes in the magnet 3 and case which are a holddown member, and Rota r which is a revolution member, and the electric connection between a stator and Rota r is attained by brush 7b.

[0008] That is, it is made to adhere to the lower substrate 2 with which the circuit was printed by the plate surface by junction etc., and this lower substrate 2 upside adheres to the magnet 3 of a doughnut configuration by the same approach in the up side of the lower housing 1 which is a circular plate.

[0009] Since it adheres to said lower substrate 2 in a part of up side of lower housing 1 at this time, lower housing 1 and the lower substrate 2 adhere to said magnet 3 broadly.

[0010] And the upper part of lower housing 1 covers with the upper housing 4 of a cap configuration with which the lower part was opened, and, as for lower housing 1 and upper housing 4, these centers are strongly connected with it by the shaft 5.

[0011] On the other hand, although the hard substrate was mainly used for the lower substrate 2 to which lower housing 1 adheres by the former, it is using a flexible substrate recently in most cases.

[0012] The stator which is a stator is provided by such configuration, and Rota r rotated focusing on a

shaft 5 is established in this stator.

[0013] Rota r turned off and lacked the circular plate at the predetermined include angle generally, and equips the shaft 5 with the up substrate 6 which eccentric support is made to be carried out. The base periphery section of the revolution core besides supported by the shaft 5 of the section substrate 6 is equipped with commutator 7a which consists of two or more segments. Moreover, it adheres to the coil coil 8 in the up side of the up substrate 6, and the insulator 9 of resin material general in the up side of the up substrate 6 from which the adhesion side of this coil coil 8 was excepted is formed in one by injection molding.

[0014] Thus, the power source which the power source inputted from the outside is first guided through the lower substrate 2 by the motor which consists of a stator and Rota r, and is guided to the lower substrate 2 is transmitted to commutator 7a through brush 7b.

[0015] At this time, brush 7b consists of couples of brush 7b of a power-source input side, and brush 7b by the side of a power outlet, and these brushes 7b has a fixed include angle mutually, and is isolated. The soffit of each brush 7b is connected in the condition of having been fixed to the circuit of the lower substrate 2, respectively, and the upper bed is maintained by the condition that sliding contact is carried out to the segment of commutator 7a.

[0016] Therefore, the current guided through the lower substrate 2 is transmitted to the coil coil 8 through commutator 7a and the up substrate 6 through brush 7b by the side of one, and a current comes to flow from the coil coil 8 through the up substrate 6, commutator 7a, and brush 7b of the side else. The condition of always energizing is maintained, by the interaction of the coil coil 8 at this time, and the magnet 3 with which that pars-basilaris-ossis-occipitalis side is equipped, electromagnetic force is generated in said coil coil 8, and driving force is obtained in it.

[0017] Since eccentric support of said Rota r is carried out at the shaft 5 at this time, it comes to carry out eccentric actuation and the operation which such eccentric driving force is told [operation] outside through a shaft 5, and vibrates a device is done so.

[0018] Therefore, a limitation is to obtain the eccentricity needed with the structure arranged so that it may prepare in the configuration which received the up substrate 6 circularly simply since the engine performance of a vibrating motor was influenced by the amount of oscillations and the amount of such oscillations was greatly influenced by the eccentricity of Rota r, cut with the predetermined include angle, and was lacked and the coil coil 8 may carry out eccentricity to such the up substrate 6 to a center of rotation at 1 side.

[0019] Therefore, although an insulator 9 is filled around this coil coil 8, the coil coil 8 being arranged at the up substrate 6, when Rota r in the vibrating motor used now uses the resin material of the high specific gravity which a metal with usually high specific gravity like a tungsten contains for the insulator 9 at this time, the eccentricity needed is offered and sufficient amount of oscillations is made to be obtained.

[0020] These coil coil 8 and the up substrate 6 are made for the eccentricity in Rota r to increase by it, as it is combined with one by insertion injection of an insulator 9, such Rota r usually arranging the coil coil 8 on both sides of the up substrate 6, as shown in drawing 2.

[0021]

[Problem(s) to be Solved by the Invention] However, since the metal component with high specific gravity like a tungsten is contained in the insulator 9 it is made to combine the up substrate 6 and the coil coil 8 by insertion injection at resin, the fluidity of an insulator 9 will be injured.

[0022] Therefore, the fairly big pressure was needed at the time of insertion injection by the insulator 9, and there was inconvenience of the up substrate 6 and the coil coil 8 being transformed by the pressure applied at the time of such injection, or making a poor product induce by an open circuit of a circuit etc. being invited in it. There was also inconvenience that productivity fell from the difficulty of injection especially.

[0023] The insulator 9 of high-specific-gravity material the weight ratio of the eccentricity actually occupied by the whole Rota r is not only very small, but moreover, still like drawing 2 When an insulator 9 was not formed only in 1 side in the core supported by the shaft 5, but it corresponded with it

and also a part was formed in a side, the insulator 9 formed in the side else came to decrease the eccentricity of Rota r rather, and was reducing the eccentric driving force by Rota r.

[0024] And since the insulator 9 of high-specific-gravity material had the very high manufacturing cost considering the function made to carry out in Rota r, there was also inconvenience of being noneconomic in it.

[0025] This invention has that main object in attaining thin shape-ization of a motor, as weight is prepared in the part to which the coil coil arranged at the 1 side of a circular up substrate and this up substrate corresponds and reduction of the eccentricity by the thickness cutback of Rota is prevented paying attention to the inconvenience in the above-mentioned conventional technique.

[0026] Moreover, other objects of this invention are to make an up substrate form circularly, skip the process of separate notching, and decrease a production process.

[0027] Furthermore, another object of this invention is to raise the oscillating engine performance of the motor which was made to maximum-ize eccentricity by weight and was thin-shape-ized.

[0028]

[Means for Solving the Problem] The upper housing with which this invention which solves the above-mentioned technical problem covers the upper part of lower housing and said lower housing, The shaft which connects and supports the center to center of said lower housing and said upper housing, The lower substrate to which it adheres in a part of upside side of said lower housing, and the magnet to which it adheres [on the outside of said lower substrate] in the upside side of said lower housing, The up substrate which it is supported by said shaft pivotable and is circular sheet metal, The commutator with which the periphery section of a shaft center is equipped as many segments on the base of said up substrate, The brush of a couple which an end is fixed to said lower substrate, and the other end is contacted by the commutator, and is connected electrically, The coil coil of the couple by which isolation arrangement is carried out at an angle of mutual regularity in one aspect of said up substrate at 1 side, It is characterized by including filling up between said coil coil, the weight of the high specific gravity arranged at a side besides a corresponding up substrate, and said coil coil and weight, and consisting of an insulator made of resin which makes these fix to an up substrate strongly.

[0029] Moreover, the upper housing with which this invention covers the upper part of lower housing and said lower housing, The shaft which connects and supports the center to center of said lower housing and said upper housing, The lower substrate to which it adheres in the upside side of said lower housing, and the magnet to which it adheres [on the outside of said lower substrate] in the upside side of said lower housing, The up substrate formed out of balance so that it may be supported by said shaft pivotable, circular sheet metal may be turned off and lacked at a predetermined include angle and eccentric support may be carried out at a shaft, The commutator with which the periphery section of a shaft center is equipped as many segments on the base of said up substrate, The brush of a couple which an end is fixed to said lower substrate, and the other end is contacted by said commutator, and is connected electrically, The coil coil of the couple by which isolation arrangement is carried out at an angle of mutual regularity in one aspect of said up substrate at 1 side, It is characterized by filling up between the weight of the high specific gravity arranged between the coil coils of said couple, and said coil coil and weight, and including the insulator made of resin which makes these fix to an up substrate strongly.

[0030]

[Embodiment of the Invention] This invention relates to the flat mold vibrating motor with which the eccentricity lowering accompanying slimming of Rota was simultaneously prevented, and thin shape-ization of a motor was attained, securing the oscillation characteristic which was made to arrange the weight which has high specific gravity in an up substrate, guided the eccentricity of Rota, and was stabilized.

[0031] Hereafter, the operation gestalt of this invention is explained, referring to a drawing.

[0032] Drawing 4 thru/or drawing 6 are the drawings in which 1 operation gestalt of this invention was shown, and it is constituted so that weight 30 may be arranged in the coil coil 27 which fixes to the up substrate 25, and the corresponding direction, as illustrated.

[0033] That is, it adheres to the lower substrate 21 in a part of up side of lower housing 20, and the magnet 22 is formed in the upper part of this lower substrate 21 and lower housing 20.

[0034] And a shaft 24 being supported in the center of said lower housing 20, upper housing 23 is combined with the upper bed of a shaft 24, and the components prepared in the upper part of lower housing 20 are protected from the exterior by insurance.

[0035] And it is combined so that eccentricity of the up substrate 25 may be carried out to a shaft 24 pivotable, and it adheres to the coil coil 27 in the up side of the up substrate 25. On the other hand, preparing commutator 26a which consists of many segments in the base of the up substrate 25, as it is connected by brush 26b of a couple, an electric signal is made to be transmitted between the lower substrate 21 and the segment of commutator 26a smoothly.

[0036] Rota r of such a configuration to this invention is constituted from the coil coil by which insertion injection is carried out, weight 30, commutator 26a, and an insulator 28 by the up substrate 25 which is the same printed circuit board as usual, and this up substrate 25 at adhesion or one, respectively.

[0037] Although especially the up substrate 25 that is a printed circuit board of sheet metal was the configuration which turned off and lacked the plate of a circle configuration at the predetermined include angle at the former, in this invention, the one description is that it uses the plate of a circle configuration as it is.

[0038] The coil coil 27 is arranged at such a circular up substrate 25 so that eccentricity may be carried out to 1 side from a core as usual.

[0039] At this time, the coil coil 27 can be formed in single phase or two phases, a three phase circuit, etc. according to the actuation property of a vibrating motor, and the up substrate 25 adheres to it by junction etc.

[0040] The point that on the other hand the weight 30 whose specific gravity is a high weight object is arranged at a side besides the up substrate 25 corresponding to the 1 side by which the coil coil 27 is arranged is the greatest description of this invention.

[0041] Weight 30 is the main elements which determine eccentricity in Rota r, and the tungsten of high specific gravity is used for it as construction material, for example.

[0042] And as for weight 30, it is most desirable to form a formation pitch within 45 degrees - 180 degrees on the minimum machine square.

[0043] Thus, this invention has the structural description in the point which arranges weight 30 in the location corresponding to the direction in which the coil coil 27 is arranged, making the up substrate 25 form on circular.

[0044] On the other hand, commutator 26a which becomes the periphery section by the side of the core supported by the shaft 24 from many segments is formed in the base of the up substrate 25 as usual, and an insulator 28 is fabricated by predetermined thickness by insertion injection in the remaining space which excepted the coil coil 27 and weight 30 in the up side of the up substrate 25 with which the coil coil 27 and weight 30 are arranged.

[0045] The insulator 28 at this time is the insulator 28 of the common resin system which it comes to make usually form by insertion injection immediately after making each one of locations the coil coil 27 and weight 30 adhere to the up substrate 25 by junction etc.

[0046] And many segments are formed at intervals of homogeneity on the base of the up substrate 25, the sliding contact of the commutator 26a is carried out to the upper bed section of brush 26b at the pars basilaris ossis occipitalis, and these segments are connected with the circuit and the electric target which were printed by the up substrate 25.

[0047] Thus, since circular, the up substrate 25 in this invention is the becoming perfect configuration, balanced support of the core is carried out at a shaft 24, and the coil coil 27 of a couple is arranged as usual as 1 side.

[0048] Thus, the coil coil 27 is arranged at the 1 side of the up substrate 25, and the weight 30 of a weight object is arranged broadly at the up substrate 25 of the side else.

[0049] Thus, the up substrate 25 is made for the load in the up substrate 25 to incline to the side by

which weight 30 is arranged, arranging the coil coil 27 to the 1 side of the up substrate 25, and making it arrange weight 30 to the side else, acting on the weight 30 side with heavy weight.

[0050] If will make the coil coil 27 of a couple isolate at an angle of predetermined to 1 side with the up substrate 25 if it puts in another way, and arrange, and it corresponds with this and also weight 30 is made to form in a side broadly, since the weight of coil coil 27 the very thing is very light, an eccentric load will come to act on the weight 30 side of heavy high specific gravity relatively actually.

[0051] Thus, vibratility can be made to maximum-ize now, the eccentricity by the side of weight 30 increasing substantially, if it corresponds with the coil coil 27 of the up substrate 25 and also weight 30 is made to form in a side broadly.

[0052] The effect to which it does to an eccentric load since the weight of the coil coil 27 is very light, although the coil coil 27 acts as a load to the eccentric load of weight 30 at this time is very small.

[0053] A formation pitch is made for weight 30 to become a minimum of 45 degrees or more on a machine square, and it is made to be formed in the magnitude to which the both ends of weight 30 approach the both ends of the coil coil 27 desirably with the up substrate 25 on the other hand.

[0054] A fixed condition is strongly maintained with the up substrate 25, adhesives being simultaneously applied to the base between the trailer of the coil coil 27, and the up substrate 25, when weight 30 is temporarily formed in the magnitude which the both ends of weight 30 approach with the both ends of the coil coil 27, although the up substrate 25 and adhesives adhere to the minimum base.

[0055] It remains, and an insulator 28 is fabricated by insertion injection by the same height as the coil coil 27 at one as [which excepted such the coil coil 27 and weight 30] area was shown in drawing 5.

[0056] The insulator 28 at this time achieves simultaneously the function the condition of adhering to the coil coil 27 and weight 30 strongly with the up substrate 25 is stabilized, and it enables it to maintain while insulating the electrical characteristics from the coil coil 27.

[0057] In order to make it especially the insulator 28 hardly affect the eccentricity by weight 30, it is formed with the construction material which has very low specific gravity, and it is [activity construction material] most desirable to use the common synthetic resin with which current [a great portion of] is applied.

[0058] Thus, it is desirable to be constituted so that it may not be fabricated by the space section formed between the coil coils 27 of a couple as the insulator 28 was shown in drawing 7 in order to increase the eccentricity of weight 30.

[0059] On the other hand, drawing 8 thru/or drawing 9 are the things illustrating the 2nd operation gestalt of the flat mold vibrating motor concerning this invention, and Rota r in this operation gestalt becomes the up substrate 25 which is a printed circuit board, and this up substrate 25 from the coil coil 27 by which insertion injection is carried out, weight 30, commutator 26a, and an insulator 28 at adhesion or one, respectively.

[0060] The coil coil 27 is arranged in such Rota r so that the plate of a circle configuration may be used and eccentricity of the up substrate 25 may be carried out to such a circular up substrate 25 at the core at 1 side.

[0061] The coil coil 27 at this time can be arranged to single phase or two phases, a three phase circuit, etc. according to the actuation property of a vibrating motor, and the up substrate 25 adheres to it by adhesion etc.

[0062] On the other hand, the weight 30 which is a weight object with high specific gravity like a tungsten is arranged at a side besides the up substrate 25 corresponding to the 1 side by which the coil coil 27 is arranged. The formation pitch of this weight 30 is formed within 45 degrees - 180 degrees on a machine square of the eccentricity of a motor.

[0063] Such a configuration is the same as that of the structure of the flat mold vibrating motor shown by drawing 4 thru/or drawing 6, and the weight 30 in this operation gestalt merely has the description in the point that the level difference section 31 is formed in a peripheral face.

[0064] That is, Rota r in this operation gestalt makes the up substrate 25 of a circle configuration form, and the level difference section 31 is formed in the peripheral face of weight 30, arranging weight 30 to the location corresponding to the direction in which the coil coil 27 is arranged.

[0065] Here, as for the magnitude and width of face of the level difference section 31 which are formed in the peripheral face of said weight 30, it is desirable to be set as extent which cannot affect the amount of oscillations accompanying the weight of weight 30, but can raise the reinforcement of an insulator 28 to max.

[0066] On the other hand, it is formed in the base of the up substrate 25 like the operation gestalt which commutator 26a which becomes the periphery section by the side of the core supported by the shaft 24 from many segments mentioned above, and an insulator 28 is fabricated by predetermined thickness by insertion injection in the remaining space which excepted the coil coil 27 and weight 30 in the up side of the up substrate 25 with which the coil coil 27 and weight 30 are arranged.

[0067] The insulator 28 at this time functions as the condition that the up substrate 25 adhered to the coil coil 27 and weight 30 strongly being maintained while insulating the electrical characteristics from the coil coil 27. Usually, an insulator 28 comes to be formed of insertion injection immediately after making each location the coil coil 27 and weight 30 adhere to the up substrate 25 by junction etc., and the thing of a general resin system is used.

[0068] That is, in order to make it said insulator 28 hardly affect the eccentricity by weight 30, it is formed with construction material with very low specific gravity, and, as for activity construction material, it is desirable [the insulator] to use the usual synthetic resin with which current [most] are applied.

[0069] As shown in drawing 10 , as for said especially insulator 28, it is desirable to constitute so that it may not be fabricated by the space section formed between the coil coils 27 of a couple, in order to increase the eccentricity of weight 30.

[0070] And many segments are formed in spacing of homogeneity on the base of the up substrate 25, the sliding contact of the commutator 26a is carried out to the upper bed section of brush 26b at the pars basilaris ossis occipitalis, and these segments are connected with the circuit and the electric target which were printed by the up substrate 25.

[0071] Thus, the up substrate 25 has circular form of sheet in Rota r according to this operation gestalt, balanced support of the core is carried out at a shaft 24, and the coil coil 27 of a couple is arranged like the operation gestalt mentioned above as 1 side of the whole surface.

[0072] Thus, when the coil coil 27 is arranged at the 1 side of the up substrate 25, it corresponds to this, and also it is constituted by the near up substrate 25 so that the weight 30 with which the level difference section 31 was formed in the peripheral face may be arranged broadly.

[0073] At this time, since thickness increases by the level difference section 31 side, rigidity of the insulator [made of resin] 28 containing said weight 30 improves as a result.

[0074] Therefore, even if it is going to break away according to turning effort and a centrifugal force in Rota r, said level difference section 31 is received by the insulator 28, and said weight 30 controls that weight 30 breaks away, even if the reinforcement of the insulator 28 which is a product made of resin in acting so that it may start strongly is weak.

[0075] Especially the end section of an insulator 28 that covers and puts the level difference section 31 of said weight 30 absorbs that the turning effort and the centrifugal force which are generated with weight 30 concentrate, and it comes to make it distribute it.

[0076] That is, it comes to be able to carry out the absorption distribution of the turning effort and the centrifugal force in which turning effort and a centrifugal force are therefore generated by acting eventually with said weight 30 at the periphery edge of the insulator 28 with comparatively thick thickness easily.

[0077] Thus, as the remaining area which excepted the coil coil 27 and weight 30 in Rota r constituted was shown in drawing 8 , an insulator 28 is fabricated by insertion injection by the same height as the coil coil 27 at one.

[0078] The operation actuation of the flat mold vibrating motor according to the above configurations is as follows.

[0079] First, like this invention, since it comes to make weight 30 form in the coil coil 27 and a corresponding location broadly, Rota r forming the up substrate 25 circularly, the eccentric load by the

side of weight 30 can be increased more greatly.

[0080] In order that especially the area that the insulator 28 of the high specific gravity arranged by insertion injection between the coil coils 27 of a couple in conventional Rota r occupies might receive a considerable limit with the coil coil 27, there was a limitation in the magnitude being limited and increasing eccentricity.

[0081] However, if arrange the coil coil 27, and it corresponds to the 1 side of this up substrate 25 with it and also it comes to arrange weight 30 to a side, forming the up substrate 25 circularly like this invention, since the area which weight 30 comes to occupy will be extended greatly, -izing of the weight of weight 30 can be carried out [maximum].

[0082] In order to have decisive effect on the eccentricity of Rota r after all, the oscillation characteristic of a vibrating motor can improve such an increment in weight of weight 30 greatly.

[0083] Although it originated in thin shape-ization of Rota r and lowering of the eccentricity accompanying a shaft was unescapable in the former when a motor was especially slimmed in connection with the trend of the miniaturization of a device, and thin-shape-izing recently, that lowering of eccentricity can be made to prevent by maximum-ization of a relative arrangement area of weight 30 can offer of course more large eccentricity with this operation gestalt.

[0084] On the other hand, since the weight 30 in this invention is arranged in the location which does not receive interference in the coil coil 27 at all, it is dramatically advantageous to the degree of freedom and layout of a design of Rota r. Therefore, the assembly of the coil coil 27 to the up substrate 25 and weight 30 can be made easier.

[0085] Moreover, the most ideal eccentricity as which a vibrating motor requires magnitude adjustment of weight 30 since it becomes possible easily can be determined now.

[0086] On the other hand, drawing 11 thru/or drawing 12 are the drawings in which the 3rd operation gestalt of the flat mold vibrating motor concerning this invention was shown.

[0087] The up substrate 25 which has the configuration which Rota r shown in this operation gestalt turned off the circular plate at the predetermined include angle, and was lacked, The coil coil 27 of the couple arranged so that it may besides be isolated by the mutual predetermined electrical angle with the section substrate 25, The weight 30 of the high specific gravity arranged between the coil coils 27 of this couple is constituted, and these [25], i.e., an up substrate, the coil coil 27, and weight 30 are combined with one by insertion injection with the insulator 28 made of resin with low specific gravity.

[0088] If it puts in another way, Rota r in this operation gestalt is constituted by the up substrate 25, the coil coil 27, weight 30, and the insulator 28, it will be isolated by the predetermined electrical angle and the coil coil 27 of a couple will be arranged at the both sides of the whole surface of the up substrate 25. On the other hand, weight 30 is arranged in the space section formed between the coil coils 27 of these couples at the periphery edge of the up substrate 25.

[0089] And the coil coil 27 and weight 30 with which these up substrate 25 is equipped are combined with one by insertion injection with the common insulator 28 made of resin.

[0090] The pure resin material in which the metal component is not contained is used, and though specific gravity is very low, it is desirable [the insulator 28 which is a means to combine the up substrate 25, the coil coil 27, and weight 30, at this time] for a fluidity to use the synthetic resin which has a good property, so that the electrical characteristics from the coil coil 27 can be insulated.

[0091] Moreover, although weight 30 is arranged at the outside periphery section from the revolution central point supported by the shaft 24 of the up substrate 25 especially between the coil coils 27 with which the both sides of said up substrate 25 are equipped, as for the weight object at this time, it is desirable to use construction material like a tungsten with very high specific gravity.

[0092]

[Effect of the Invention] As mentioned above, if weight is arranged between the coil coils of the couple with which an up substrate is equipped as explained in full detail, the eccentricity in Rota can be made to maximum-ize, the eccentric larger driving force of Rota can be obtained at the time of actuation of a vibrating motor, and an oscillation characteristic can be made to improve as a result.

[0093] Moreover, since the insulator with low specific gravity has the very high fluidity and a high-

pressure injection pressure like before is not needed at the time of insertion injection, deformation of an up substrate or a coil coil and the risk of an open circuit are avoidable.

[Translation done.]

